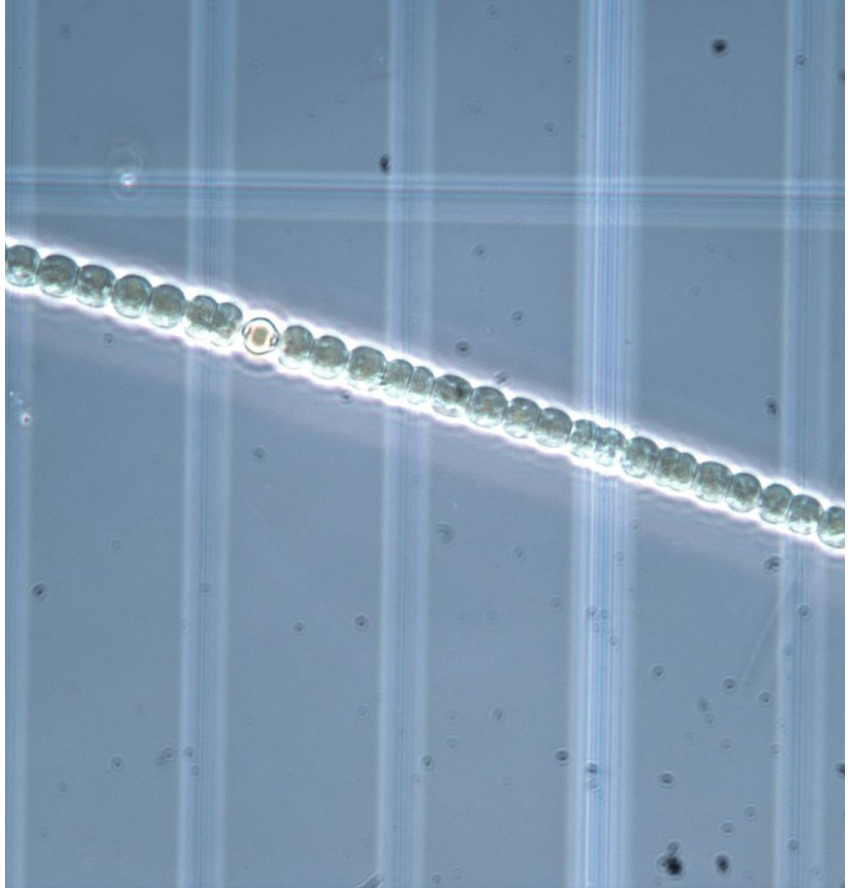




Proposed 2020 HABs Strategy Overview and Discussion

Teams Meeting

May 21, 2020

Introduction and Ground Rules

Kerry Kirk Pflugh
Manager, Local Government Assistance, DEP

AGENDA

- **Introduction/Ground Rules** – Kerry Kirk Pflugh
- **Meeting Objectives and Governor's HABs Initiative** –
  Kati Angarone, DEP Associate Commissioner, Science & Policy
- **Proposed 2020 HAB Recreational Response Strategy** –
- Leslie McGeorge, DEP Administrator, Bureau of Freshwater & Biological Monitoring
- **Questions and Answers** - All

Meeting Objectives and Governor's HAB Initiative

Kati Angarone, DEP Associate Commissioner, Science & Policy

Proposed 2020 HAB Recreational Response Strategy

Leslie McGeorge, Administrator
Bureau of Freshwater & Biological Monitoring (BFBM)

Presented at:
HAB Strategy Overview and Discussion

May 21, 2020

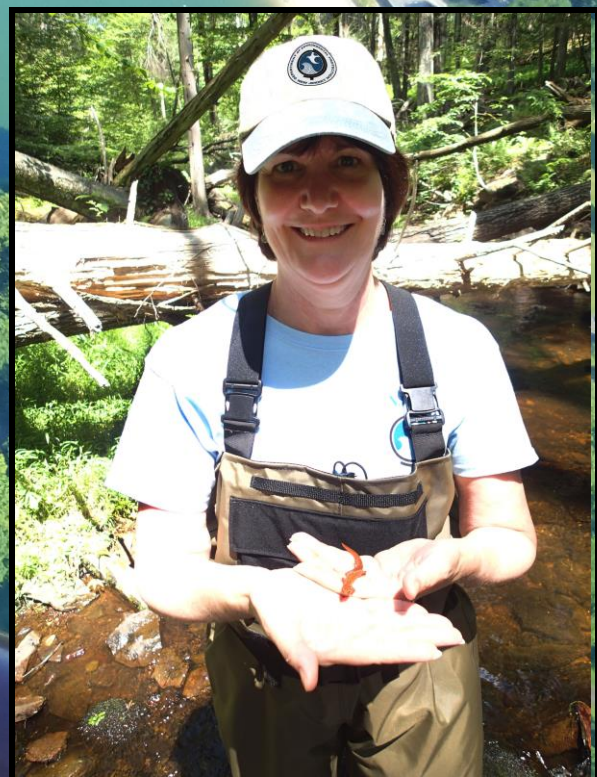
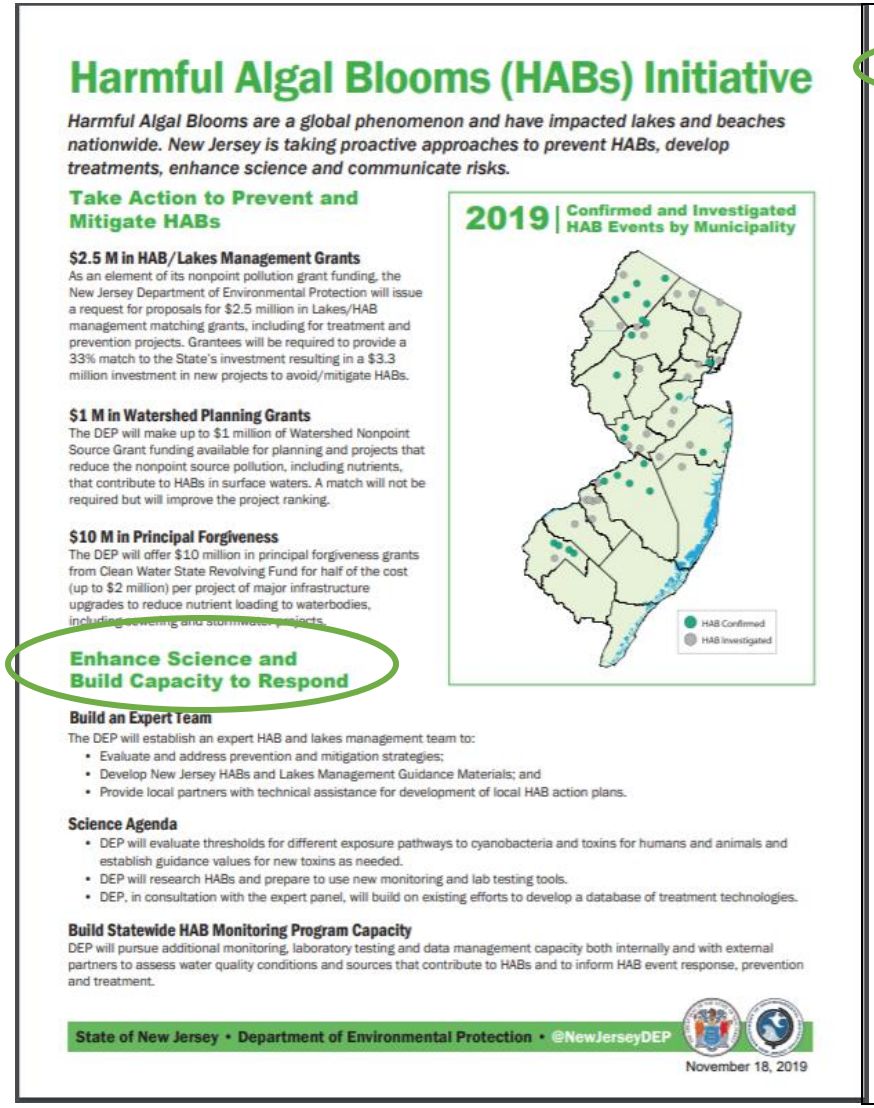


Photo: Spruce Run (8/9/19)

Governor's November 2019 HABs Initiative



Harmful Algal Blooms (HABs) Initiative

Harmful Algal Blooms are a global phenomenon and have impacted lakes and beaches nationwide. New Jersey is taking proactive approaches to prevent HABs, develop treatments, enhance science and communicate risks.

Take Action to Prevent and Mitigate HABs

$2.5 M in HAB/Lakes Management Grants
As an element of its nonpoint pollution grant funding, the New Jersey Department of Environmental Protection will issue a request for proposals for $2.5 million in Lakes/HAB management matching grants, including for treatment and prevention projects. Grantees will be required to provide a 33% match to the State's investment resulting in a $3.3 million investment in new projects to avoid/mitigate HABs.

$1 M in Watershed Planning Grants
The DEP will make up to $1 million of Watershed Nonpoint Source Grant funding available for planning and projects that reduce the nonpoint source pollution, including nutrients, that contribute to HABs in surface waters. A match will not be required but will improve the project ranking.

$10 M in Principal Forgiveness
The DEP will offer $10 million in principal forgiveness grants from Clean Water State Revolving Fund for half of the cost (up to $2 million) per project of major infrastructure upgrades to reduce nutrient loading to waterbodies, including sewering and stormwater projects.

2019 | Confirmed and Investigated HAB Events by Municipality

HAB Confirmed
HAB Investigated

Enhance Science and Build Capacity to Respond

Build an Expert Team
The DEP will establish an expert HAB and lakes management team to:
- Evaluate and address prevention and mitigation strategies;
- Develop New Jersey HABs and Lakes Management Guidance Materials; and
- Provide local partners with technical assistance for development of local HAB action plans.

Science Agenda
- DEP will evaluate thresholds for different exposure pathways to cyanobacteria and toxins for humans and animals and establish guidance values for new toxins as needed.
- DEP will research HABs and prepare to use new monitoring and lab testing tools.
- DEP, in consultation with the expert panel, will build on existing efforts to develop a database of treatment technologies.

Build Statewide HAB Monitoring Program Capacity
DEP will pursue additional monitoring, laboratory testing and data management capacity both internally and with external partners to assess water quality conditions and sources that contribute to HABs and to inform HAB event response, prevention and treatment.

State of New Jersey • Department of Environmental Protection • @NewJerseyDEP

November 18, 2019

Improve Communication

Regional HAB Summits
DEP will host two regional summits (north and central/south) for the purpose of sharing and gathering information where experts, governmental officials, businesses and members of the public will gather to share information and expertise on treatment and mitigation of HABs.

Enhance Web Tools
- A new and improved HAB website, including updated scientific information.
- A new interactive HAB mapping app.

Assist Local Governments
- Provide municipalities with compliance assistance to help with stormwater and septic discharges compliance.
- Investigate facilities surrounding waterbodies to ensure compliance with discharge permits and identify facilities that are not permitted.
- Work with local government to map and maintain essential stormwater infrastructure.
- Assist locals to develop and implement long-term capital improvement plans to upgrade storm and sewer infrastructure.
- Help municipalities and local health agencies regarding risk communication and protection of ground water sources of potable water supply.

While at Lake Hopatcong, the DEP's Johannus Franken (Bureau of Freshwater and Biological Monitoring) and Commissioner Catherine R. McCabe discuss HAB sampling procedures.

As part of the HAB monitoring process, microbiologist Robert Newby, Ph.D., (Division of Science and Research) counts cells at a DEP lab.

Report a HAB

To report what could be a HAB in a lake, pond, river, or stream, call the NJDEP Hotline at 1-877-WARNDEP (927-6337) or download the free WARN NJDEP *mobile app* from iTunes, Google Play or Windows Phone.

For more information, please visit the NJDEP Harmful Algal Blooms website: www.nj.gov/dep/hab/

State of New Jersey • Department of Environmental Protection • @NewJerseyDEP

Enhance Science & Build Capacity to Respond

- Evaluate thresholds and guidance values – cyanobacteria & toxins
- New monitoring and testing tools
- Build DEP & external capacity – monitoring, lab testing & data management

Improve Communication

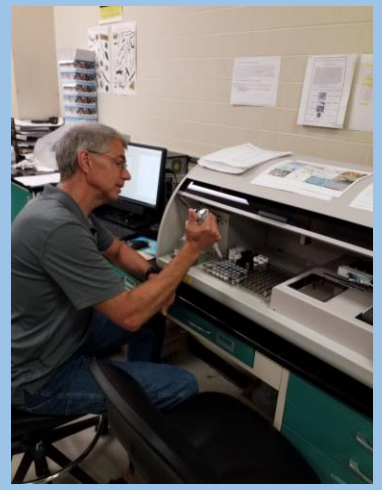
- Improve HAB website
- Build interactive HAB reporting tool

HAB Strategy Development and 2020 Revisions

- Interagency Workgroup - initiated Strategy development in 2016, released in 2017, reviewed and enhanced through 2020

- 2020 Proposed Strategy revised by Interagency Workgroup and DEP HAB Task Force

- Workgroup
  - 7 DEP Programs
  - 2 DOH Programs
  - 1 NJDOA Program



  - 4 Committees
    - Health Effects, Monitoring/Testing, Research and Communications

2020 HAB Strategy Development - External Input

- Greenwood Lake and Lake Hopatcong Commission Meetings (2)
- 2 HAB Summits – Pequest Natural Resource Education Center & Rutgers EcoComplex
- 2 NJ Water Monitoring Council HAB Technical Meetings

STRATEGY CHANGES RELATED TO GOV'S HABS INITIATIVE

Gov's HABs Initiative Strategy Needs	2018/19 Strategy	2020 Proposed Strategy
Evaluate existing Advisory Guidance Levels – Cells count and 3 Toxins New Toxins	**Cell count** – 1 threshold ≥20,000 cells/mL **3 Toxins** >3µg/L Microcystins >8 ug/l Cylindrospermopsin >27 ug/l Anatoxin	**Cell Count** – 3 thresholds ≥20,000, ≥40,000 (monitoring) and ≥80,000 cells/mL **Toxins** – Advisory toxin thresholds for toxins remain the same New Toxin in progress - Saxitoxin
Evaluate notification/ advisory tiers • Enhance alignment of advisory tiers w/expected adverse health responses • Use new 2017-2019 NJ HAB Database	**2 tiers** – Warning (Suspected) Danger (Confirmed)	**5 tiers** - Watch – Suspected and Confirmed- Cell Count, toxins Alert – Cell Count (beach monitoring) Advisory – Cell Count, toxins Warning - microcystins Danger - microcystins
• **Enhance communication** • Develop **interactive mapping & reporting system**	**Division/Bureau HAB website**: Monitoring, Testing, Strategy, **Advisory Signs,** Outreach factsheets **HAB event reporting- Table** by municipality usually w/o data	**Comprehensive DEP HAB website -** Expanded web presence -e.g. links to drinking water, prevention. **New advisory signs. HAB event reporting - Interactive mapping tool** by site or waterbody w/data
• **Advance monitoring, lab testing, research & data management** • **Enhance capacities -** all areas	**Limited advanced monitoring tools** **No DEP lab certification** for Toxins **No HAB database** **Capacities limited** –internal & external	**Advanced monitoring tools** included **DEP certification available** for microcystins **HAB database developed (2017-2019)** **Internal capacity** enhancement? **External Capacities** – NJ Water Monitoring Council (NJWMC), CEHA, Watershed Assoc's

ADVISORY GUIDANCE LEVELS

Gov's HABs Initiative Strategy Needs	2018/19 Strategy	2020 Proposed Strategy
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Reminder: Why Cyanobacterial Cell ID's & Densities Are Important

- **Harmful algal bloom definition** – generally ≥ 20,000 cyanobacterial cells per milliliter (ml)
- Blooms are variable – can **begin producing toxins** when not previously & dominant HAB species can change
- Individuals may have **different sensitivities** to exposures to cells
- Exposure to cells (without toxins) can cause **skin rashes, eye and ear irritation, mouth ulcers, vomiting and diarrhea, and fever**
- Such **symptoms can be of concern,** particularly when they occur in children.

Cyanobacterial Cell Counts

Cell Count (cells/ml)	Observation	Citation
≥ 5,000	Increased risk of mild irritative and allergenic effects.	Pilotto et al., 1997; cited by WHO (2003)
≥ 20,000	• Defined as a bloom. • WHO guideline for irritative and allergenic effects.	• USGS/Loftin et al. (2008) • WHO (2003)
≥ 80,000	Increased probability of microcystin concentration > 3 µg/L (NJDEP guidance level)	BFBM and DSR analyses of NJ data

Review of Basis of Cyanotoxin Reference Doses
Division of Science and Research

- *Newer studies provide additional support for the microcystin and cylindrospermopsin Reference Doses. No new studies for anatoxin-a.*
- ***No revision to current DEP Reference Doses or Recreational Advisories***

Cyanotoxin	NJDEP Reference Dose (µg/kg/day)	NJDEP Criterion (µg/L)
Microcystin-LR	0.01	3
Cylindrospermopsin	0.03	8
Anatoxin-a	0.1	27
Saxitoxin	underway	underway

Tiered Microcystin Threshold Values

	Recreational Threshold Values
Advisory	**3 µg/L**
Warning (new)	**20 µg/L (new)** • *California and Ohio "Danger" level; New York – "Confirmed with High Toxins Bloom"* • *WHO states that adult dose could be close to WHO TDI (Tolerable Daily Intake) and child dose could be 10-times WHO TDI.* • *USEPA (based on WHO) – "high relative probability of acute health effects."*
Danger (new)	**2,000 µg/L** • *Kansas and Utah "Danger" level.* • *Child dose would be ~750 times the NJ Reference Dose and only ~5 times < dose causing toxicity in animal studies.* • *USEPA (based on WHO) – "very high relative probability of acute health effects."* • *Based on USEPA screening analysis – Daily inhalation dose near a lake with 2,000 µg/L estimated as several-fold higher than NJDEP Reference Dose.*

NOTIFICATIONS/ ADISORY TIERS

Gov's HABs Initiative Strategy Needs	2018/19 Strategy	2020 Proposed Strategy
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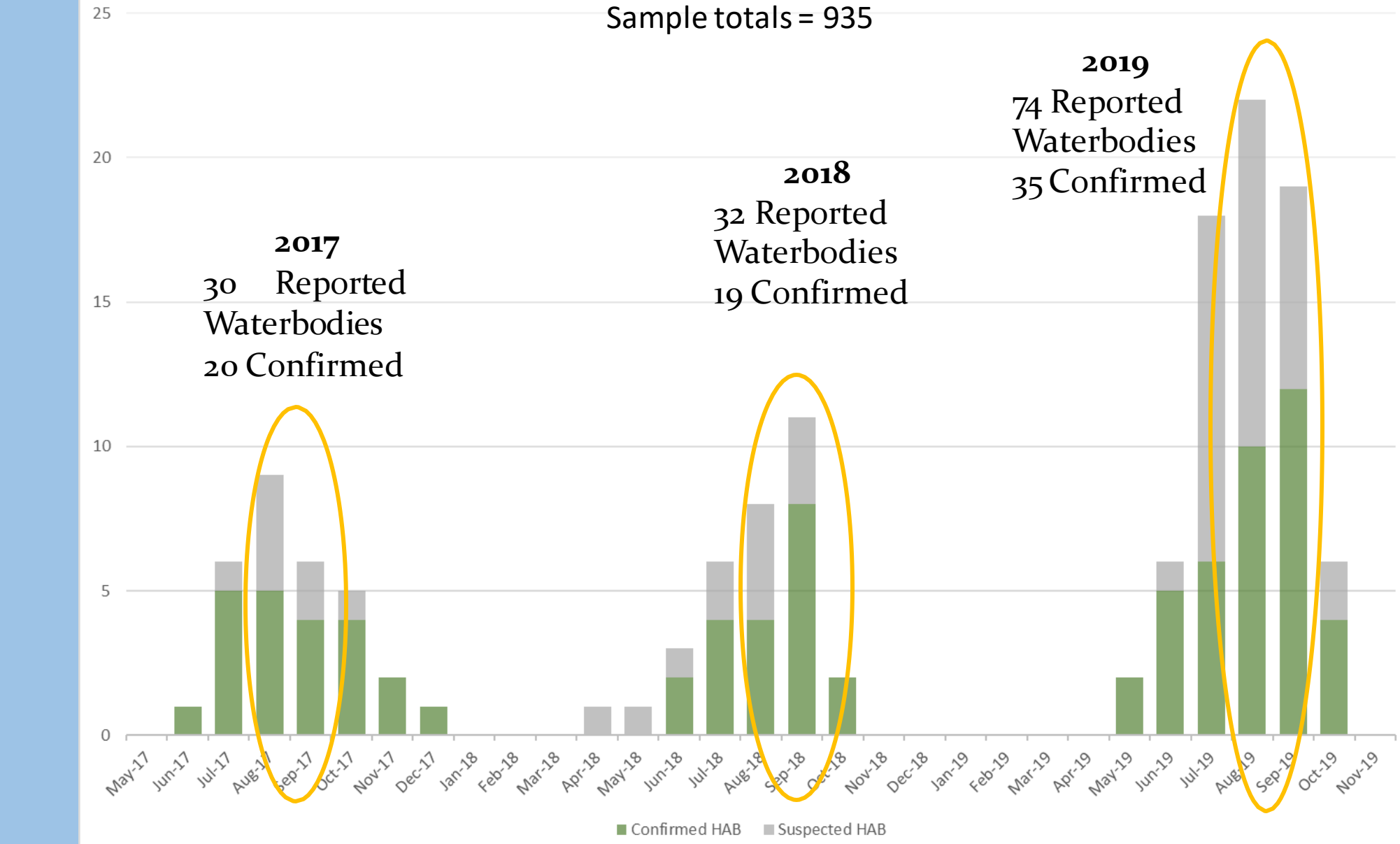
WATERBODIES WITH SUSPECTED HAB REPORTS CONFIRMED 2017-2019

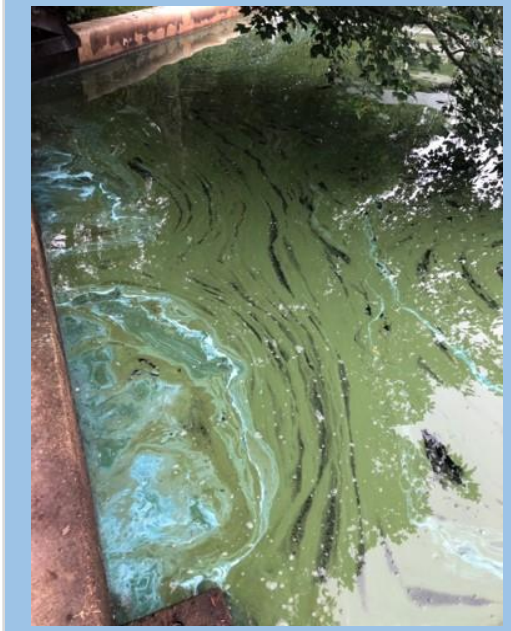
Sample totals = 935

2017
30 Reported Waterbodies
20 Confirmed

2018
32 Reported Waterbodies
19 Confirmed

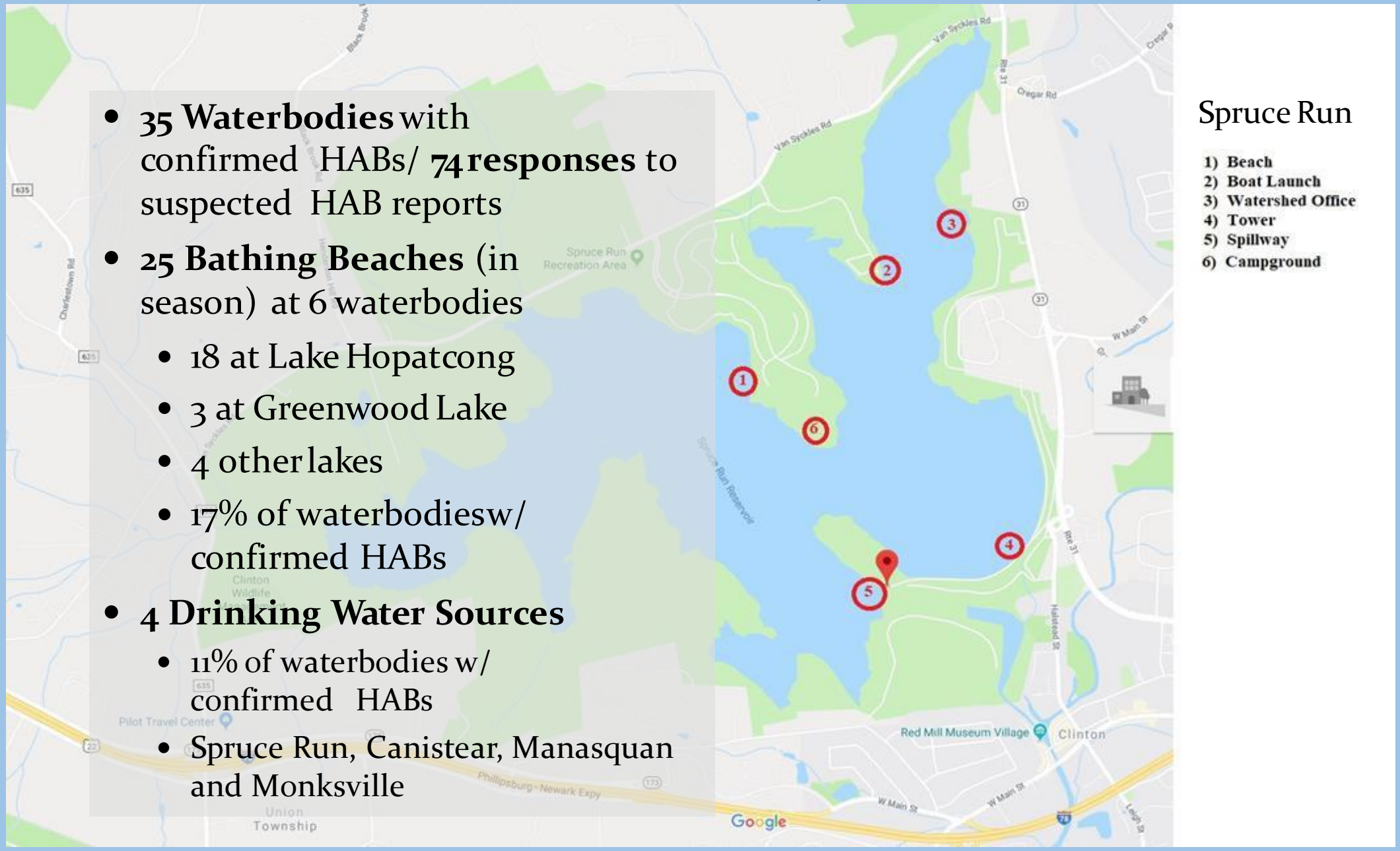
2019
74 Reported Waterbodies
35 Confirmed

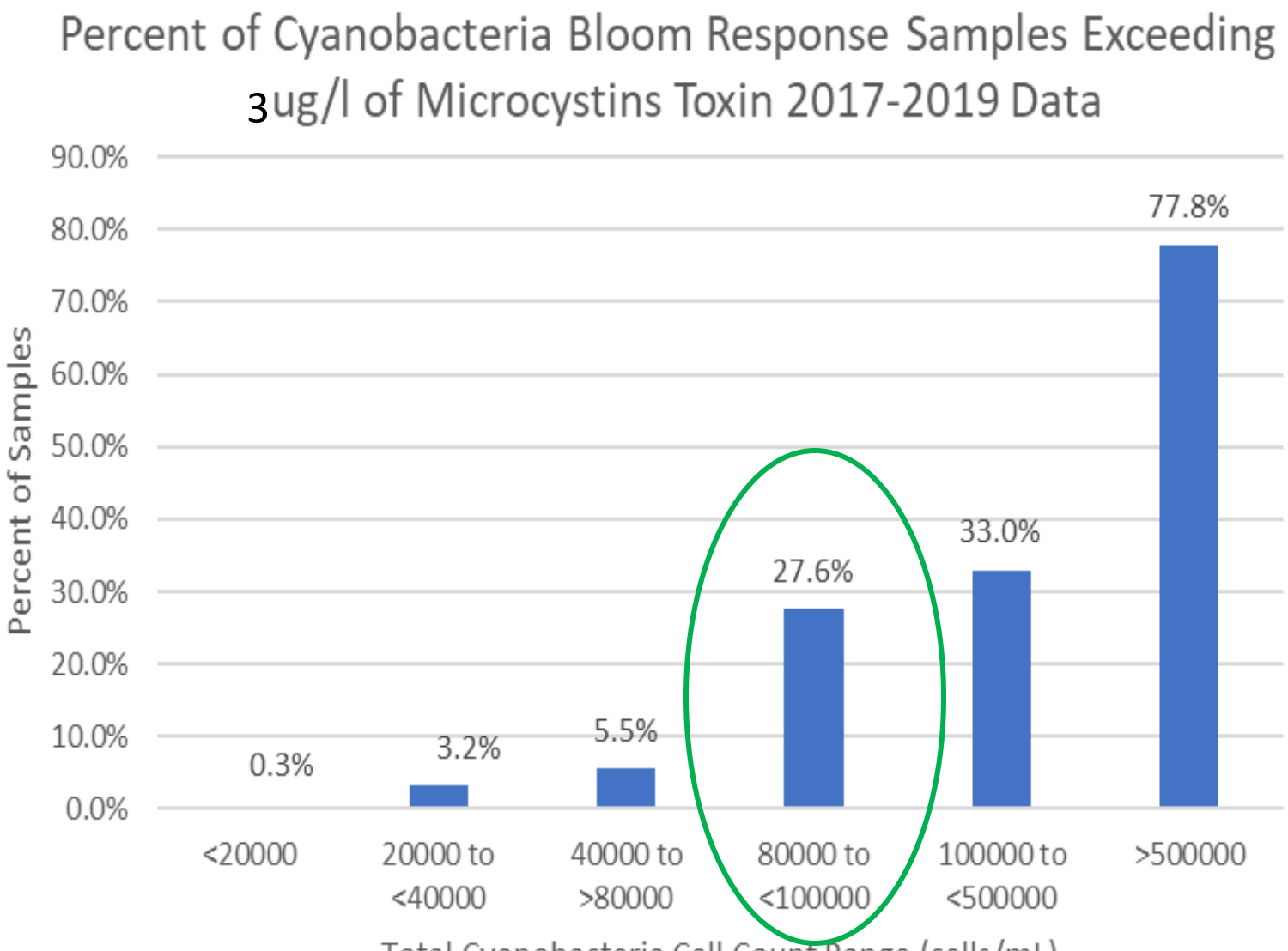




HAB Event Summary - 2019

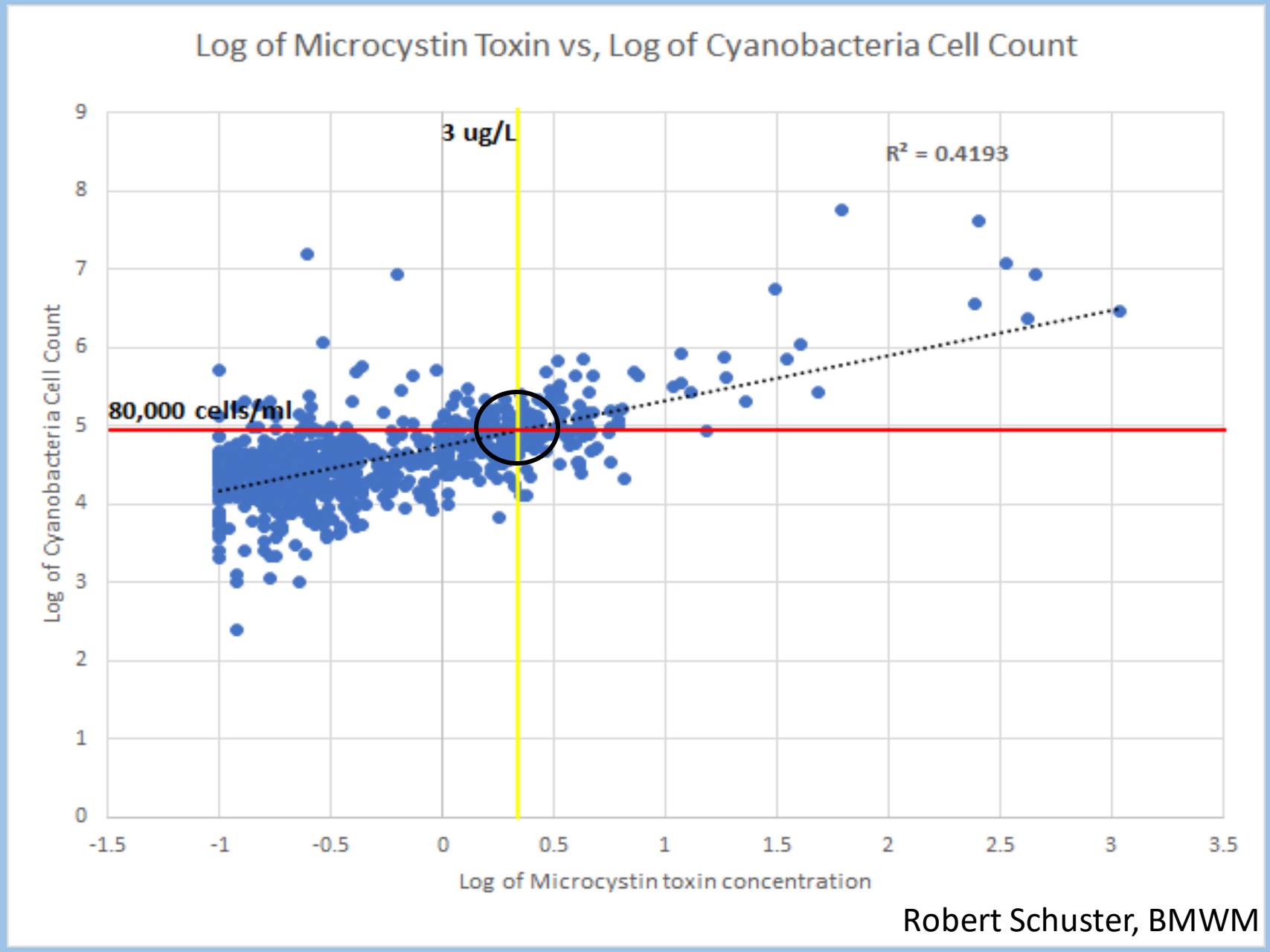
- **35 Waterbodies** with confirmed HABs/ **74 responses** to suspected HAB reports
- **25 Bathing Beaches** (in season) at 6 waterbodies
  - 18 at Lake Hopatcong
  - 3 at Greenwood Lake
  - 4 other lakes
  - 17% of waterbodies w/ confirmed HABs
- **4 Drinking Water Sources**
  - 11% of waterbodies w/ confirmed HABs
  - Spruce Run, Canistear, Manasquan and Monksville



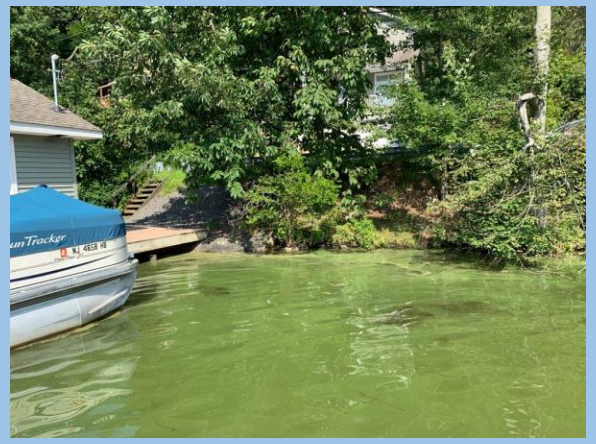

Percent of Cyanobacteria Bloom Response Samples Exceeding 3ug/l of Microcystins Toxin 2017-2019 Data
Percent of Samples
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
0.3%
3.2%
5.5%
27.6%
33.0%
77.8%
<20000
20000 to <40000
40000 to >80000
80000 to <100000
100000 to <500000
>500000
Total Cyanobacteria Cell Count Range (cells/mL)
% of samples> = 3ug/l microcystin toxin

Sample # = 935

Relationship of Cell Counts to Microcystins



Robert Schuster, BMWM



2020 HAB ALERT TIERS

HAB ALERT LEVEL	CRITERIA	RECOMMENDATIONS
NONE	No HAB present or reported.	None
WATCH *Suspected or confirmed HAB with potential for allergenic and irritative health effects*	Suspected HAB based on visual assessment or screening test OR Lab confirmed cell counts between 20k – 40k cells/mL AND No known toxins above public health thresholds	Public Bathing Beaches Open (dependent upon local health authority evaluation and assessment) Waterbody Accessible: ➢ Use caution during primary contact (e.g. swimming) and secondary (e.g. non-contact boating) recreational activities Do not ingest water (people/pets/livestock) Do not consume fish
ALERT *Confirmed HAB that requires greater observation due to increasing potential for toxin production* **PUBLIC BATHING BEACHES INCREASE MONITORING**	Lab confirmed cell counts between 40k – 80k cells/mL AND No known toxins above public health threshold	**WATCH remains in effect.** **Public Bathing Beaches Open (dependent upon local health authority evaluation and assessment) and should observe and report changing bloom conditions** Waterbody Accessible: ➢ Use caution during primary contact (e.g. swimming) and secondary (e.g. non-contact boating) recreational activities Do not ingest water (people/pets/livestock) Do not consume fish
ADVISORY *Confirmed HAB with **moderate risk** of **adverse health effects** and increased potential for toxins above public health thresholds*	Lab testing for toxins exceeds public health thresholds OR Lab confirmed cell counts above 80K cells/mL OR Field measurement evidence indicating HAB present and above guidance thresholds (e.g. phycocyanin readings)	Public Bathing Beaches Closed Waterbody Remains Accessible: ➢ Avoid primary contact recreation (e.g. swimming) ➢ Use caution for secondary contact recreation (e.g. boating without water contact) Do not ingest water (people/pets/livestock) Do not consume fish
WARNING *Confirmed HAB with **high risk** of **adverse health effects** due to high toxin levels*	Toxin (microcystin) 20 - 2000 µg/l AND/OR Additional evidence, including, expanding bloom, increasing toxin levels (i.e. duration, spatial extent or negative human or animal health impacts) indicates that additional recommendations are warranted	Public Bathing Beaches Closed Waterbody Remains Accessible: ➢ Avoid primary contact recreation (e.g. swimming) ➢ May recommend against secondary contact recreation (e.g. boating without water contact) with additional evidence Do not ingest water (people/pets/livestock) Do not consume fish
DANGER *Confirmed HAB with **very high risk** of **adverse health effects** due to very high toxin levels*	Toxin (microcystin) > 2000 µg/l AND/OR Additional evidence, including, expanding bloom, increasing toxin levels (i.e. duration, spatial extent or negative human or animal health impacts) indicates that additional recommendations are warranted	**Closure of Public Bathing Beaches** **Possible closure of all or portions of waterbody and possible restrictions access to shoreline.** **Avoid primary contact recreation (e.g. swimming)** **May recommend against secondary contact recreation with additional evidence** **Do not ingest water (people/pets/livestock)** **Do not consume fish**

Beach monitoring tier

WATCH

HAB Alert Level	Criteria	Recommendations
WATCH ***Suspected or confirmed HAB*** *with potential for allergenic or irritative health effects*	**Suspected HAB** based on visual assessment or screening test **OR** Lab confirmed cell counts between **20K-40K** cells/mL **AND** **No known toxins above public health thresholds**	**Public Bathing Beaches** open (dependent upon local health authority evaluation and assessment) _____ Waterbody Accessible: ➢ Use caution during primary contact (e.g., swimming) and secondary (e.g., no contact boating) recreational activities _____ Do not ingest water (people/pets/livestock) _____ Do not consume fish

ALERT (Beach Monitoring Tier)

HAB Alert Level	Criteria	Recommendations
ALERT ***Confirmed HAB*** *that requires greater observation due to increasing potential for toxin production* **PUBLIC BATHING BEACHES- INCREASE MONITORING**	Lab confirmed cell counts between **40K-80K c**ells/mL **AND** **No known toxins above public health threshold**	**WATCH remains in effect** **Public Bathing Beaches** open (dependent upon local health authority evaluation and assessment) and should observe and report changing bloom conditions Waterbody Accessible: ➢ Use caution during primary contact (e.g., swimming) and secondary (e.g., no contact boating) recreational activities Do not ingest water (people/pets/livestock) Do not consume fish

ADVISORY

HAB Alert Level	Criteria	Recommendations
ADVISORY ***Confirmed HAB*** *with* ***moderate risk of adverse health effects*** *and increased potential for toxins above public health thresholds*	Lab testing for **toxins exceeds public health thresholds OR** Lab confirmed cell counts **above 80K** cells/mL **OR** Field measurement evidence indicating HAB present and above guidance thresholds (e.g., **phycocyanin readings)**	**Public Bathing Beaches** closed _____ Waterbody Remains Accessible: ➢ Avoid primary contact (e.g., swimming) ➢ Use caution for secondary contact recreation (e.g., boating without water contact) _____ Do not ingest water (people/pets/livestock) _____ Do not consume fish

WARNING

HAB Alert Level	Criteria	Recommendations
WARNING *Confirmed HAB with **high risk** of **adverse health effects*** due to high *toxin levels*	Toxin (microcystin) **20-2000** µg/L **AND/OR** **Additional evidence including expanding bloom, increasing toxin levels** (i.e., duration, spatial extent or negative human or animal health impacts) indicates that additional recommendations are warranted	**Public Bathing Beaches** closed Waterbody Remains Accessible: ➢ Avoid primary contact (e.g., swimming) ➢ **May recommend against secondary contact recreation** (e.g., boating without water contact) with additional evidence Do not ingest water (people/pets/livestock) Do not consume fish

DANGER

HAB Alert Level	Criteria	Recommendations
DANGER *Confirmed HAB with **very high risk** of **adverse health effects*** due to very high *toxin levels*	Toxin (microcystin) **>2000 µg/L** **AND/OR** **Additional evidence including expanding bloom, increasing toxin levels** (i.e., duration, spatial extent or negative human or animal health impacts) indicates that additional recommendations are warranted	Closure of **Public Bathing Beaches** **Possible closure of all or portions of waterbody and possible restrictions of access to shoreline** Avoid primary contact recreation (e.g., swimming) May recommend against secondary contact recreation with additional evidence Do not ingest water (people/pets/livestock) Do not consume fish

ENHANCE COMMUNICATION

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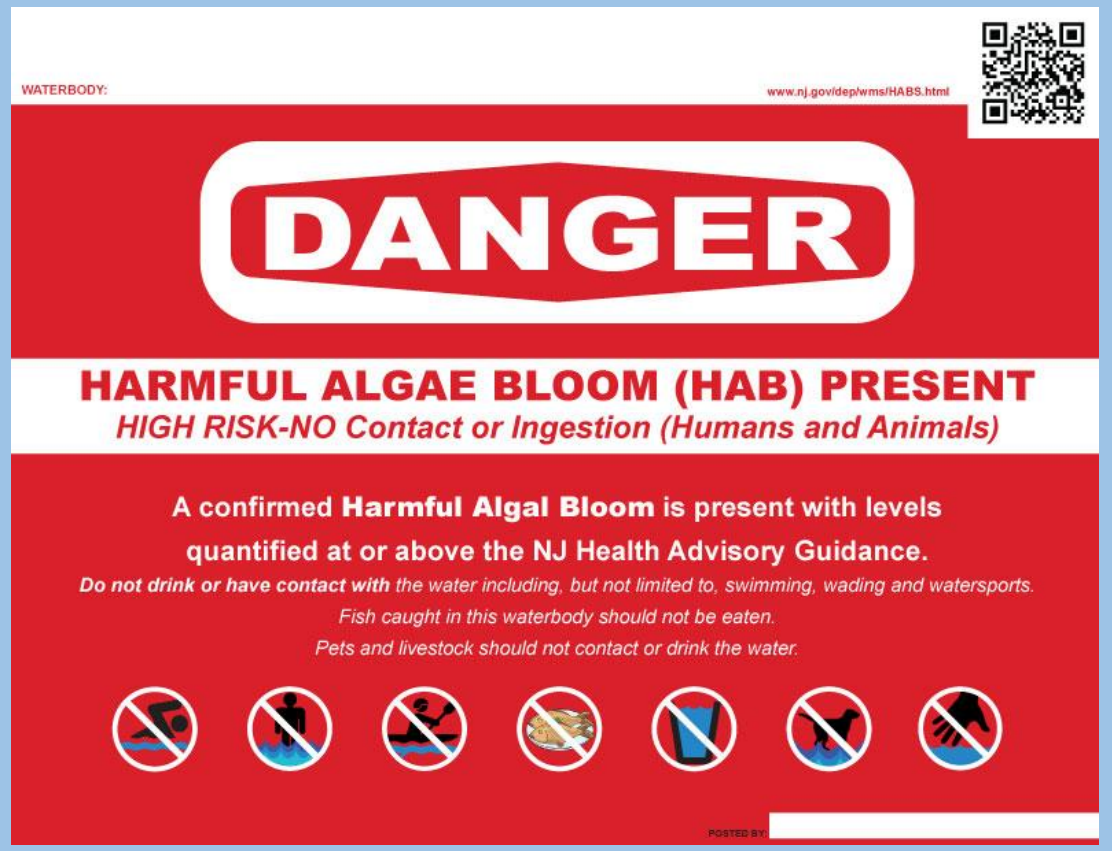
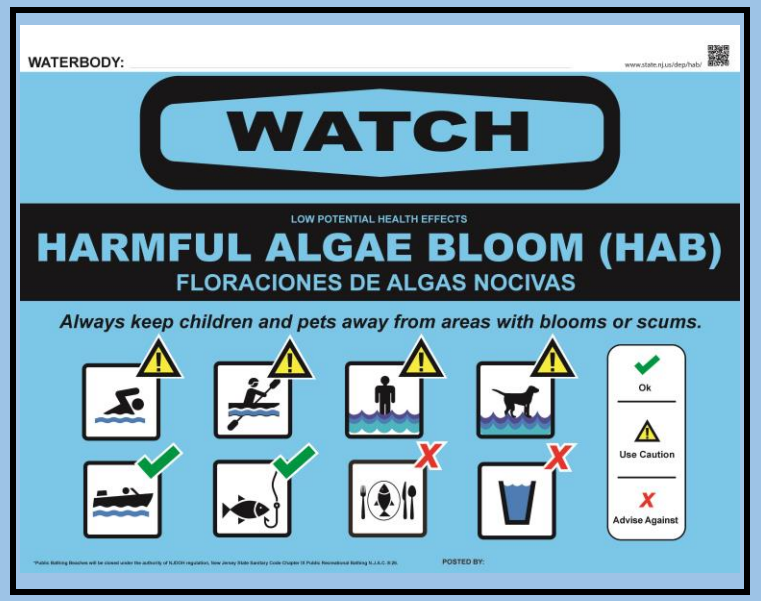
2018/2019 Advisory Signs

Suspected HAB



Greater that 20,000 cells/mL or 3 µg/L

Proposed 2020 Advisory Signs*



- ≥20,000-80,000 cells/ml AND
- Toxins below thresholds
- Beaches open (dependent upon Local Health Authority)

- ≥80,000 cells/ml OR
- >3 µg/L (microcystins)
- >8 µg/L (cylindrospermopsins)
- >27 µg/L (anatoxin-a)
- Beaches closed
- Advice on primary recreation (e.g., Swimming, kayaking)

* **Beach Closure** sign will also be provided

Proposed 2020 Advisory Signs (cont)

- 20-2000 µg/L (microcystins)
- Beaches closed
- May include advice on secondary recreation - boating/fishing

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- >2000 µg/L (microcystins)
- Beaches closed
- Access to portions of or entire waterbody may be prohibited

BEACH CLOSED
PLAYA CERRADA

HARMFUL ALGAE BLOOM (HAB)
No Swimming • No Wading
FLORACIONES DE ALGAS NOCIVAS No nadar • No vadear

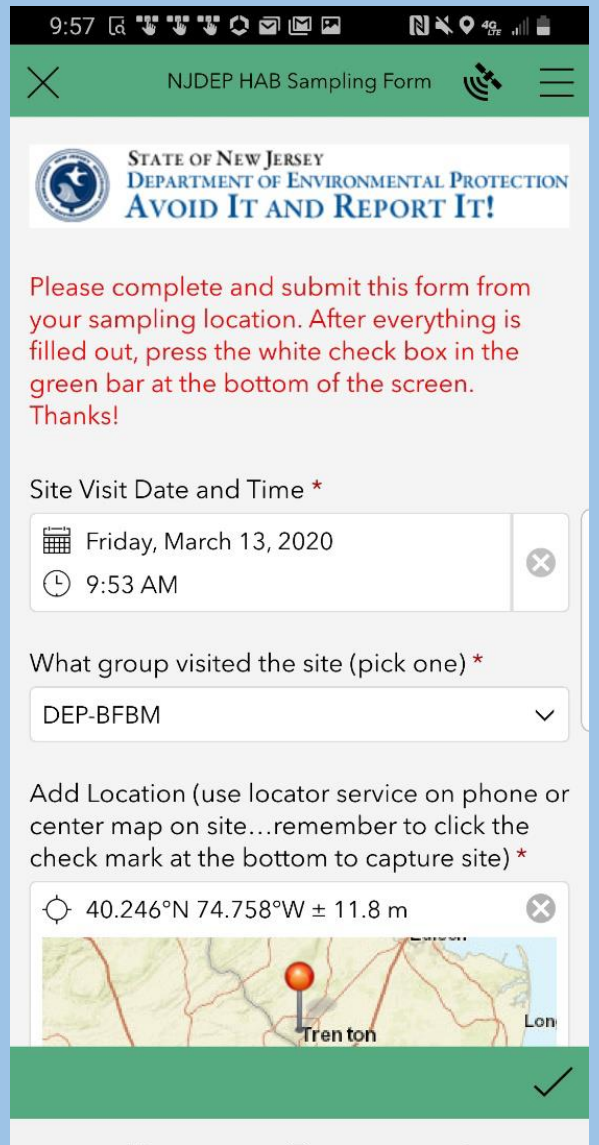
Contact can make people and animals sick.
El contacto puede enfermar a personas y animales.

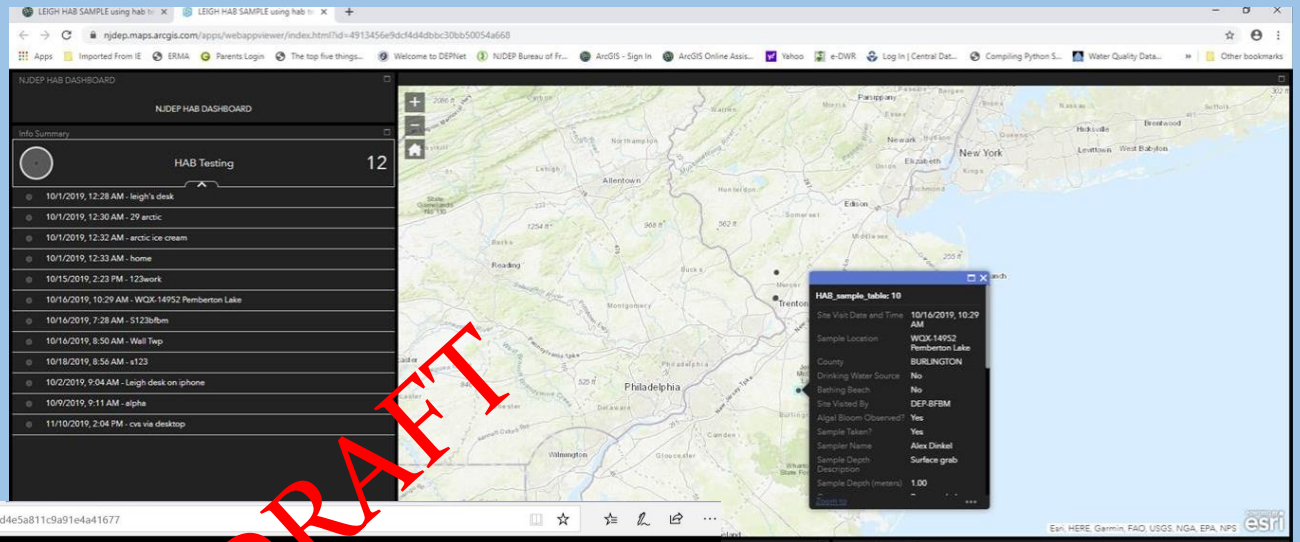
www.state.nj.us/dep/hab/

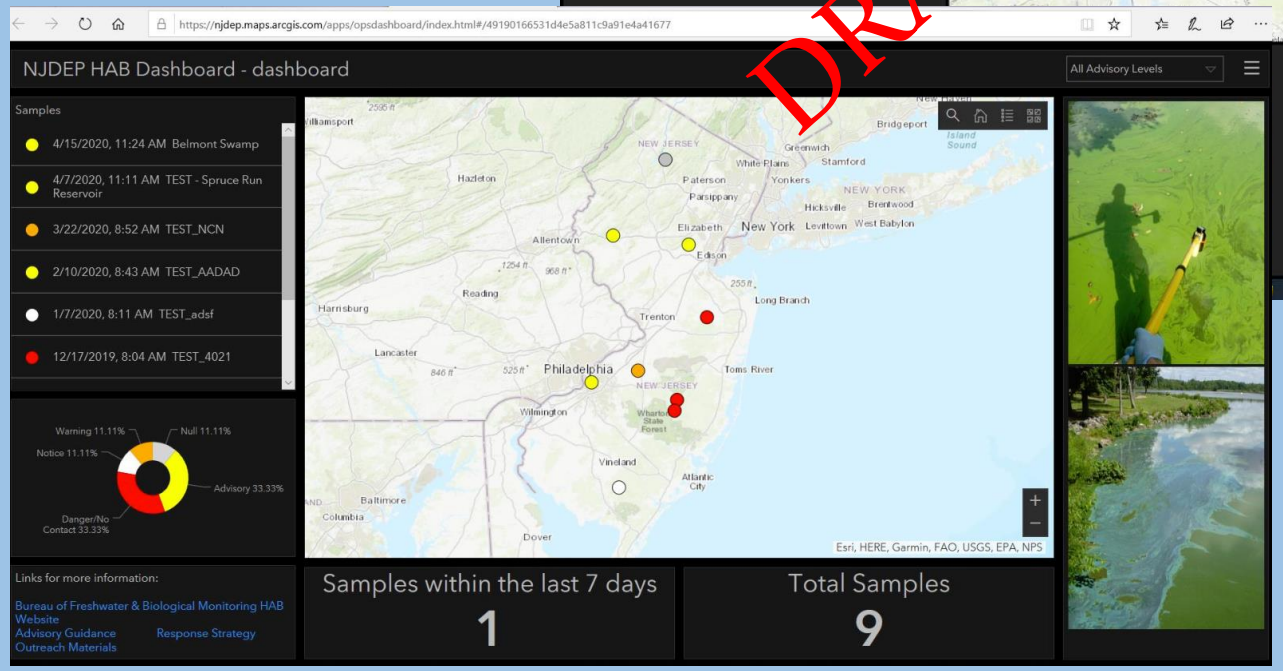
*Public Bathing Beaches are closed under the authority of NJDOH regulation, New Jersey State Sanitary Code Chapter IX Public Recreational Bathing N.J.A.C.8:26.

POSTED BY:

HAB Interactive Mapping and Communication System (reporting system, searchable map, data, alerts…)



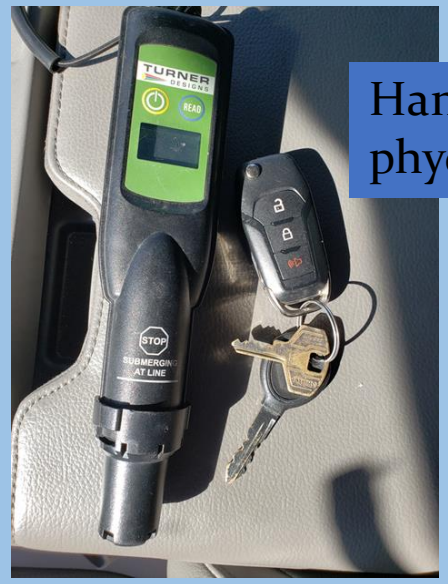




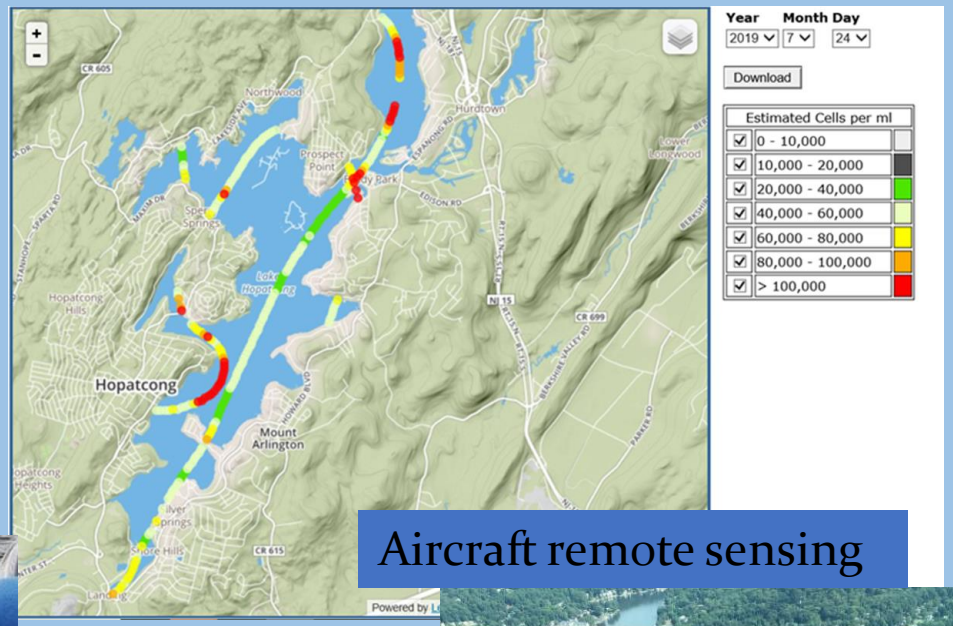
MONITORING, LAB & RESEARCH

Gov's HABs Initiative Strategy Needs	2018/19 Strategy	2020 Proposed Strategy
Evaluate existing Advisory Guidance Levels – Cells count and 3 Toxins New Toxins	**Cell count** – 1 threshold ≥20,000 cells/mL **3 Toxins** >3µg/L Microcystins >8 ug/l Cylindrospermopsin >27 ug/l Anatoxin	**Cell Count** – 3 thresholds ≥20,000, ≥40,000 (monitoring) and ≥80,000 cells/mL **Toxins** – Advisory toxin thresholds for toxins remain the same New Toxin in progress - Saxitoxin
Evaluate notification/ advisory tiers • Enhance alignment of advisory tiers w/expected adverse health responses • Use new 2017-2019 NJ HAB Database	**2 tiers** – Warning (Suspected) Danger (Confirmed)	**5 tiers** - Watch – Suspected and Confirmed- Cell Count, toxins Alert – Cell Count (beach monitoring) Advisory – Cell Count, toxins Warning - microcystins Danger - microcystins
• **Enhance communication** • Develop **interactive mapping & reporting system**	**Division/Bureau HAB website**: Monitoring, Testing, Strategy, **Advisory Signs,** Outreach factsheets **HAB event reporting- Table** by municipality usually w/o data	**Comprehensive DEP HAB website -** Expanded web presence -e.g. links to drinking water, prevention. **New advisory signs.** **HAB event reporting - Interactive mapping tool** by site or waterbody w/data
• **Advance monitoring, lab testing, research & data management** • **Enhance capacities** - all areas	**Limited advanced monitoring tools** **No DEP lab certification** for Toxins **No HAB database** **Capacities limited** –internal & external	**Advanced monitoring tools** included **DEP certification available** for microcystins **HAB database developed (2017-2019)** **Internal capacity** enhancement? **External Capacities** – NJ Water Monitoring Council (NJWMC), CEHA, Watershed Assoc's

DEP Use of Advanced Technology for HABs Monitoring & Testing



Hand-held phycocyanin meters



Aircraft remote sensing

qPCR – molecular testing for toxin production potential

Continuous monitoring buoys

Summary of Key 2020 Proposed Strategy Revisions

- Data and science-driven enhancements with interested party and public input
- Five alert tiers (one monitoring tier) vs two tiers
- Better alignment between advisory tiers and potential adverse health risks, including increased focus on toxins
- Improved communication through:
  - Clearer signs, including activities that are ok to do (e.g., boating)
  - Interactive mapping tool
- Enhanced application of advanced monitoring tools

QUESTIONS AND ANSWERS

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